

THE GIANT FRESHWATER FISHES OF ASIA

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(With 4 plates and 4 text figures.)

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INTRODUCTION

Some time ago I set to work to answer the oft-asked question —'What is the largest fish'—but I soon saw that the freshwater fishes had to be studied apart from the marine forms. Then, because there are so many large freshwater fishes worthy of consideration, it became clear that, to keep the articles within bounds, these fishes must be studied by continents. For North America, the great white sturgeon of the Columbia River and the huge alligator gar of the Mississippi and other rivers flowing into the Gulf of Mexico were figured and measurements and weights were given. For South America, this has been done so far as possible for the Pirarucu of the Guiana and Amazon rivers, and for the giant catfishes of the Guiana, Amazon and La Plata Systems. For Africa there is only the great Nile Perch, which was worshipped and mummified by the ancient Egyptians 25 centuries ago, and whose portrait was painted as early as 2780 B.C.

And now, passing by Australia, which has no freshwater fish qualifying for this category, attention will be given to certain giant fishes in the rivers of South-eastern Asia, the greatest conti-

ment. Little is known of these and that little is published in books and journals not generally accessible. Hence the bringing together of these data, to make them known to those interested, while difficult, has seemed worth while.

THE GIANT FISHES OF INDIA.

There are in this great peninsula, two fishes which have long been held to be the largest freshwater fishes of the largest continent. Because of this belief, because they are the two largest fishes in India, and because of the presence of kindred fishes in the neighbouring peninsula of Indo-China, with which they will be compared, they must be considered here.

The 'Mighty Mahseer', *Barbus tor*.

This great cyprinoid fish has been exploited under the designation noted as the largest sporting (rod and reel) fish in Indian waters. Chiefly because of this exploitation, I have, in the absence of definite knowledge, long thought it to be the largest freshwater fish of Asia. So, expecting to get the facts to confirm this belief, I confidently went to H. S. Thomas's 'The Rod in India'. But to my disappointment, while this contains much data on angling and on specimens which are fairly large, from our standpoint there is little to justify the cognomen—'Mighty Mahseer'.

However, Thomas quotes from a letter written him by G. P. Sanderson (author of *Thirteen Years among the Wild Beasts of India*) concerning a huge specimen which he caught but was not able to weigh. Sanderson estimated it at 150 pounds. 'I had no means of weighing it, but I found it was as much as I could lift a couple of inches off the ground by hugging it in my arms; no one but a big Mussalman peon in camp could do so much as this. . . . I have since lifted a man of over 10 stones [140 pounds] with greater ease than the fish'. This fish was only 60 in. long over all, but was 38 in. in greatest girth. 'It was an astonishingly thick and heavy fish for its short length. It had shoulders like a bullock.' Then Sanderson adds 'I have no doubt that they run over 200 or 250 pounds, as I have seen teeth and bones of them larger than those of my 150-pounder.' These are of course only general estimates, not scientific records, but coming from G. P. Sanderson, they cannot be cast aside as wholly valueless.

The figure of *Barbus tor* reproduced herein (Fig. 1, pl. I) is copied from Thomas. It is the almost exact counterpart of the splendidly mounted skin in the Fish Hall of the American Museum. This skin, which came from India a number of years ago, is 57 inches long to the base of the caudal fin, and 64 inches long over all. The scales are very large. The largest ones just behind the operculum average about 3.2 in. in vertical diameter. Both figure and mounted skin show the Mahseer to be a clean-cut handsome fish. It is a fine sporting fish, and this may ex-

plain why it is called Mahseer. Thomas quotes a Persian scholar that the name is derived from the Persian *mahi* a fish and *sher* a lion, in allusion to its gameness.

The illustration reproduced herein is a splendid drawing of *Barbus tor*, but it gives one no idea of the relative size of this great carp. However Thomas has, embossed in gilt on the cover of his book (2nd ed., 1881), a figure showing a mahseer seemingly about five feet in length swung up to a limb of a tree. Leaning against the trunk of the tree is a man about five and a half feet tall. This illustration gives one a very good idea of the relative size attained by this great cyprinoid.

Sanderson states that another and slenderer specimen measured 5 feet 6 inches but weighed only 80 pounds. This fish was large but it is not a record fish. However, two high records have been made by C. E. Murray Aynesley. In 1906 he captured the largest mahseer of which any account has been found. Its length was 60 in.; girth 37 in.; mouth 8.5 in. across; tail-spread (vertical) 19 in.; and weight 104 lbs. He fought this fish two hours and it took two men to land it. In 1909, he records another and only very slightly less heavy. It was 64 in. long; 39 in. in girth; mouth and tail as in the other fish; and 103 lbs. in weight. This fish was also so large and powerful that two men were needed to bring it ashore. The Mahseer probably grows larger as Sanderson suggests, but so far no records of larger specimens have been found.*

The Goonch, *Bagarius bagarius*.

There are in India several catfishes which furnish great sport to anglers. Some of them are so large, have such formidable

* In Vol. xliii, No. 4, p. 662 of the Society's *Journal*, we published a note by Col. R. W. Burton, giving details of record mahseer. A mahseer (*Barbus tor*) taken by Lt.-Col. J. S. Rivett-Carnac, in the Cauvery River, 44 miles from Mysore, on the 28th December 1919, measured as follows:—length, 64 in.; girth, 42 in.; weight, 119 lbs.

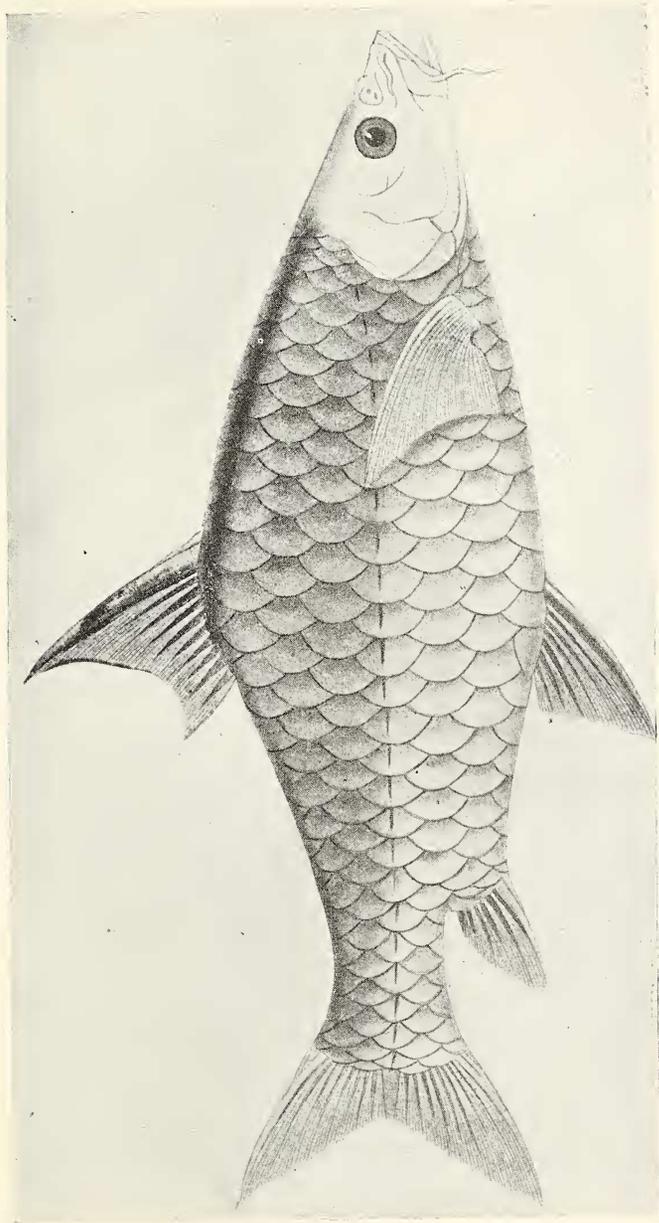
A second specimen taken by Mr. A. E. Lobb, in the Kabani River, 65 miles from Mysore, on the 22nd October 1938, measured as follows:—length, 60 in.; girth, 38 in.; weight, 110 lbs.

A third specimen of this species caught in the Cauvery River near Seringapatam on the 15th January 1920 by Mr. de Wet Van Ingen, measured as follows:—length, 62½ in.; girth, 38½ in.; weight, 107 lbs.

Col. Burton commenting on these measurements says: 'It is interesting with these large mahseer to refer to *The Rod in India*, where the measurements of a mahseer, believed by Sanderson to have weighed 150 lbs., are the same as those of Mr. Lobb's 110 lbs. fish.'

Photographs of the 119- and 110-lb. fish were published with the note and give a good idea of the relative size of these great fishes as compared with the men standing by.

The genus *Barbus* includes yet another Asiatic large carp [*Barbus esocinus* (Heckel)]. A specimen measuring 6 ft. 4 in. in length and 3 ft. 10 in. in girth and weighing 215 lbs. was caught in the Euphrates River at Hakika, Mesopotamia, in 1917 (*J.B.N.H.S.*, xxv, 308) it was at the time wrongly identified as *Barbus scheidt* (Heckel). A second example of the same species, 5 ft. 9 in. long, 3 ft. 2 in. in girth and scaling 123 lbs. was caught by Major H. L. Colan, I.A., in the Diabla River, Mesopotamia, in 1918 (*J.B.N.H.S.*, xxvi, 679). A photograph of this fish carried by four men on a pole gives a good idea of its size.—Eds.



THE MAHSEER, *Barbus tor*. This drawing splendidly portrays this great carp.



THE GOONCH or 'FRESHWATER SHARK', *Bagarius bagarius*.
Contrast this lateral view with the dorsal one of Text-fig. 1. From Thomas (1881) after Day, 'Fishes of India', 1875.

teeth, and are so predatory that they have been dubbed 'Fresh-water Sharks'. They are of course not sharks (Elasmobranchs) but catfishes (Siluroids). However the common name does not



Text-fig. 1.—A Goonch (*Bagarius bagarius*) hung by the head with the shikari standing beside it for comparison as to size.
After Cyril Kirkpatrick in *The Field* (London), 1875.

seem so totally inappropriate when in a lateral view of the largest of these, the Goonch (*Bagarius bagarius*), one sees that the mouth is somewhat 'underhung' like a shark's and not terminal as in the catfishes generally (Hora, 1939). Then again the general ugliness of this fish, particularly when seen in dorsal view (Text-fig. 1), is very repulsive. However, Hora (1939) notes that the Goonch is very variable in both form and color, as may be seen in both his text-figure and color plate.

The largest of these 'freshwater sharks' on record, so far as I can find, is a Goonch taken with rod and reel in 1875 at the head works of the Agra Canals in the Jumna River near Okhla, India. It was figured and described by Cyril Kirkpatrick in *The Field* (1875). This specimen weighed 136 lbs. and measured as follows: length to fork of tail, 5 ft.; overall, 5 ft. 8 in.; girth of head, 3 ft. 6 in.; width of mouth, 1 ft. 6 in. It was taken on a light rod and fought the angler for over 2 hours. Two men were required to drag it ashore. In the 1897 edition of his book, Thomas states that this was at that time the largest fish that had ever been taken with rod and reel in India.

Text-fig. is a copy of the cut in *The Field* made from a photograph of the fish taken at the time of capture, with the shikari ('a man of ordinary size') standing beside it. From this one readily gets a correct idea of what a big and ugly brute a full-grown Goonch is. However, a better representation is seen in the fine

drawing of the fish in lateral view reproduced from Thomas (Fig. 2, pl. I).

Large as this fish was, it probably is not the maximum size. The distinguished Indian ichthyologist, Dr. Sunder Lal Hora, in a late article (1939) on the Goonch, states that '. . . it grows to a size of 6 ft. or more and to a weight of over 250 lbs.'

THE GIANT FISHES OF SIAM.

Large as are the Goonch and the Mahseer, each has one or more relatives in the rivers of Siam larger than it—and indeed, so far as is known at this time, each of these is the largest of its family in the whole world. The progressive development of our knowledge of these great fishes makes a story not devoid of interest and value.

The Pla Biik, *Pangasianodon gigas*.

Our earliest knowledge of this huge siluroid dates back to 1904, when Auguste Pavie published in Paris his 'Recherches sur l'Histoire Naturelle de l'Indo-Chine Orientale'. Pavie 64 years ago headed the 'Mission Pavie l'Indo-Chine, 1879—1895'. This expedition studied the voyages to, the geography, literature, history of this great peninsula, and Pavie published the results in ten thick volumes. Volume III of this series is, as noted above, given over to natural history studies—the various groups of animals collected being described by various specialists. In the introductions to 'Première Classe—Poissons' are found five reproductions from photographs of a huge catfish. The photographs may have been poor; in any case the reproductions are small and lack sharpness—they merely show a massive logy fish. The largest does give some idea of the shape and relative size, but it does not seem worth while to reproduce it, even though it is the earliest known representation of our fish. Splendid figures from excellent photographs will be given later.

In his introduction to the fishes (described by Leon Vaillant), Pavie, earliest of all Europeans, makes known this gigantic catfish, which he says merits particular attention because it often grows to a size of 1-1/3 meters—but which his best photograph shows to be about 6 or 8 ft. long.

Pavie states that the Cambodians call it *Trey-Réach* or royal fish probably on account of its great size. They take this fish in great numbers at the time of the rains in the Mekong off Pnom-Penh, and at the narrows of Quatre-Bras. At this time the fish is very fat and from its flesh much oil is obtained. As the flood in the river subsides, the *Trey Réach* ascends the Mekong and when it reaches Luang-Prabang in February it has lost its fat. At this time the fishermen are on the lookout and when they see the fish, which swims almost at the surface, they set out in many canoes with long shallow nets and bar its passage. The fishing is carried on until June. The flesh is preserved in brine, and of the eggs is made a kind of caviar much esteemed in Laos. The numbers taken at Luang-Prabang varied—1,400 in 1889 and 6,000

in 1890. The Laotians allege that only the females ascend the river, and that the males never leave the upcountry lakes but await the females there.

The Laotians call this great siluroid *Pla boeuk*. It was assigned by the experts at the Paris Museum to the long-established genus *Pangasius*, but the species could not be determined for lack of specimens. Vaillant in his description of the species collected by Pavie, does not list it for the same reason.

Pavie saw the fishing about 1890, and in 1921, A. H. Duke described a 'Curious Fishing Ceremony near Vien Chan on the Upper Mekong'. This fishing was carried on at the time of the full moon in February by the Laos people for a huge fish locally called 'Pla Bük'. About the identity of this animal Duke had doubts and his account of its natural history is at least remarkable, due to the fact that he saw neither fish nor fishing, but merely reported what was told him.

He makes some interesting statements (some true and some untrue about the Pla Büks. Thus—'They are about 12 ft. in length, and 8 to 10 ft. girth have smooth black skins and are scaleless. Their heads are blunt and mouths toothless. The females have a pair of mammae (?). When caught their stomachs are never found to contain anything but stones'. When they are seen rising and ascending the river, then the fishing is undertaken. Only certain skilled men are allowed to do the fishing. Boats laden with long wide-meshed seines go up stream and drop these at certain narrow defiles. The fish blunder into the seines and are caught by the gills. The fishermen come up and guide them ashore, where they are tethered in the water by a rope through the mouth and gills until sold. 'The fish is said to be very powerful, and it is alleged that purchasers living upstream utilize them to tow their boats home.' There is no doubt that one of these huge fish could tow a small boat, but how about guiding this unruly aquatic steed? The flesh is much prized and eagerly consumed by the Laos people.

One such interesting observation when published almost inevitably leads to another. And so two years later Eric Seidenfaden (1923) refers to Duke's account, corroborates it in part and much extends our knowledge of the Pla Bük. Seidenfaden identified our great fish as a siluroid and states that it attains a length of 3 m. (9 ft., 10 in.) and a weight of 240 kg. (528 lbs.). At Vien Chan the fish are driven into a narrow rocky bay where they are easily taken in long narrow nets of rope and each fish is then tethered by a rope through mouth and gills. Seidenfaden saw one so tied and estimated its length at about 2.5 m. (98 in.), its girth at 1.7 m. (67 in.) and its weight at 180 kg. (396 lbs.). Thus tethered the fish in the water lives and its flesh is better even than if kept in a refrigerator. So at the fish wharf in Key West, Florida, I have seen the great grouper called Jewfish so tied to a pile while awaiting customers for its flesh.

Next, F. H. Giles in 1932 records the taking at Chiengsen on the Upper Mekong on July 12, of a large female Pla Bük, which he saw and which he assigns to the genus *Pangasius*. This fish

was 87 in. long and had a girth of 50 in. It was much smaller than that seen by Duke. This female was in spawn and while the fish was not weighed, the roe was—88 pounds. It as well as the flesh is esteemed as a great delicacy.

Pi rre Chevey had long been interested in the fishes of Indo-China and in our giant catfish, when he journeyed to that country and saw in the museum at Phnom-Penh two casts of this giant each measuring, 2.5 m. (98.5 in., 8 ft., 2 in.). Two years later (August, 1930) he saw in the market of this town a specimen about 2 m. long. On examining it he was surprised to find it absolutely lacking in teeth, and, since *Pangasius* has teeth, it was necessary to set up for this giant a new genus—*Pangasianodon*; *Pangasius*—*an* without, *dens*, tooth; and species, *gigas*=gigantic. I know no fish more fittingly named. However, strange to say, Chevey, while accurately describing this new fish, reproduced photographs of the two casts but got no photograph of the fish itself.

After a long and distinguished service in the U. S. Bureau of Fisheries—ending with 9 years in the Commissionership—Dr. Hugh M. Smith retired in 1922. But in 1923 he went to Siam and served there until 1935 as Fisheries Adviser to the Siamese Government. While in Siam, Dr. Smith collected material (specimens, notes, and photographs) for an extensive monograph (as yet unpublished) on Siamese fishes. My attention was called some years ago by Dr. Smith to the three species of giant fishes of Indo-China, noted herein.

Mr. Thomas Slack, a resident of Bangkok, presented to Dr. Smith three photographs of a huge Pla B k taken at Chiengsen on the Mekong in Northern Siam. These Dr. Smith has given me permission to reproduce. Two of them were sent by Mr. Slack to the *Illustrated London News* and were reproduced with notes by himself and Dr. Smith in its issue of August 22, 1931. Mr. Slack saw the huge fish tethered in the water as described above. He had it trussed up and hauled out alive on the bank in order to take the photographs referred to. He measured it and found it to be 100 in. long over all and 54 in. girth over the thickest part. He had no means of weighing it, but estimated its weight at about 400 lbs. This weight seems to me to be at least 100 lbs. too light. Mr. Slack calls attention to the elevated platform from which a lookout warns of the approach of these great fish as they come up stream in shallow water during the dry months (Plate II, Figs. 1 & 2), of the trussed up fish lying on the bank of the river, gives a better idea of the size and make up of this colossal catfish.

Dr. Smith wrote me that at one time he had in preparation an article on the giant catfishes of Siam, but that press of other work had prevented his finishing it. His data will undoubtedly be found in his 'Fishes of Siam', left unfinished by his untimely death in 1941, but brought to completion by the devoted labours of Dr. L. P. Schultz, Curator of Fishes in the U. S. National Museum. The only data he ever published on the Pla B k appears along with the note and figures from photographs by Mr. Slack (referred to above) in the *Illustrated London News*. Since



Fig. 1.—Greatest of all known Catfishes, the Siamese Pla Bük of Mekong River. Behind the fish is an elevated platform from which the lookout watches for these giants swimming at the surface of the water. From a photograph by Thomas Slack in *Illustrated London News*, Aug. 22, 1931.

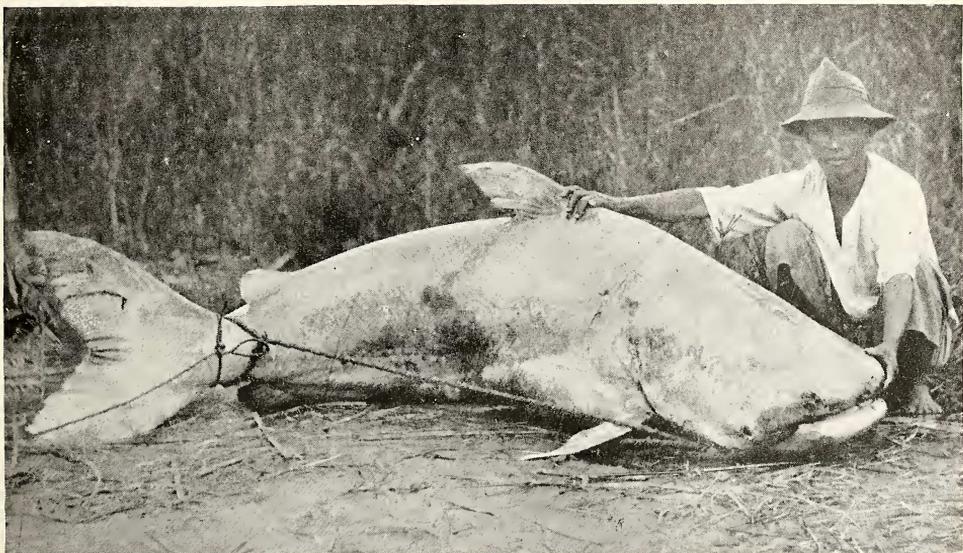


Fig. 2.—The Great Pla Bük (*Pangasianodon gigas*) trussed up and hauled out on the bank of the Mekong River in order to be photographed and measured. From a photograph by Thomas Slack loaned by Dr. H. M. Smith.

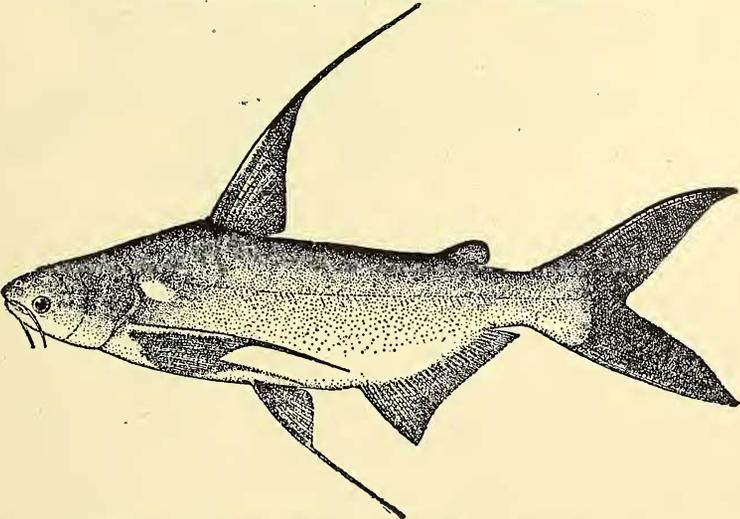
Dr. Smith is one of two scientific men who have seen this great fish alive, it will be of great value to record here his observations.

The Pla Bük is a colossal catfish of the Mekong River, in Siam and Indo-China. It ranges as far inland as Chieng Sen, in northern Siam, opposite the Northern Shan States, and has a well-defined up-stream migratory movement, beginning in February. A fishery, attended by great ceremony and participated in by 800 boats with two or three men in each, has been conducted for many years in a narrow part of the river between Siam and French Laos, near Viengchan. The fishery is held only during three days following the full moon in February and wide-meshed nets made of rope are the only apparatus used. The catch in recent years has been small.

The zoological status of the Pla Bük has been somewhat uncertain. The fish is a *Pangasius*, a genus numerously represented in Indo-China, Siam, Burma, Malaya, and the Dutch Indies, but the specific determination has been made difficult by the fact that no fish with a less length than 1.5 metres has ever been recognized and it is known that fishes of certain species of *Pangasius* undergo considerable change in shape, dentition, and feeding habits with advancing age. The Pla Bük has no teeth, and its food consists wholly of aquatic vegetation, chiefly algae, cropped from stones in the swift waters of the Mekong. A maximum length of 3 metres is attained, but fish over 2.5 metres have been very scarce for many years. A fish 3 metres (118 in., 9 ft. 10 in.) long would probably weigh over 250 kilogrammes (550 lbs.); one specimen, 2.5 metres (98.5 in.) long and 1.7 metres (67 in.) in girth, weighed 180 kilogrammes (396 lbs.). Recently (1930) . . . Mr. P. Chevey has described the Pla Bük as a new species, and made it the type of a new genus, *Pangasianodon gigas*. The new genus is characterized by the absence of teeth, but it remains to be determined whether the character holds good for young and medium-sized fish.

Dr. Smith sent me copies of Mr. Slack's photographs used in the joint article noted above, and reproduced herein, but was unable to find a photograph which he himself had made of a fresh caught Pla Bük which measured 2.47 metres [97.24 in., 8 ft., 1 in.] long.

The Pla Tapa—***Pangasius sanitwongseii***.



Text-fig. 2.—A giant Siamese Catfish (*Pangasius sanitwongseii*), the Pla Tapa, which has been taken up to 3 m. (9 ft. 10 in.) in length.

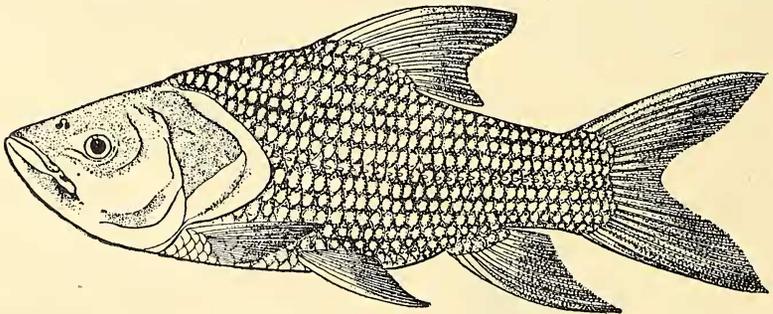
After H. M. Smith, 1931.

This giant catfish, a close relative and a rival in size of the Pla Bük, is found in the Menam River. It was unknown to science until it was figured and described by Dr. Smith (1931). The figure (a drawing of a fresh or recently preserved fish) is shown herein as Text-fig. 2 for comparison with photographs of the Pla Bük (Pl. III). All these colossal catfishes are so heavy and so soft-bodied that when brought ashore they flatten down. It is a great pity that they were not hung up by head or tail, with a man standing by for comparison. The Pla Tapa, while heavy bodied, is more trimly built than the Pla Bük, has a deeply forked tail with sharp-pointed lobes, and has dorsal, pectoral, and pelvic fins with long filaments—whereas Pla Bük has none of these. But like Pla Bük it grows to great size. Here is what Dr. Smith says on this point:

In point of size this fish rivals the celebrated *Pangasius* of the Mekong basin called Pla Bük by the Siamese. In former times fish 3 meters (118 in.) in length were sometimes taken, and at least one fish of that size has been recorded within eight years. In recent years, examples over 1.5 meters in length have been rare. . . . Named in honor of Dr. Yai S. Sanitwongsei, . . . who first brought this species to the writer's attention and pointed out its distinctive characters.

The Pla Kaho, *Catlocarpio siamensis*.

The *Barbus tor* of India (Fig. 1, pl. I), of which the record * specimen was 60 in. long, 37 in. girth, and 104 lbs. in



Text-fig. 3.—The giant of all carps, the Siamese Pla Kaho (*Catlocarpio siamensis*). Note the huge head and deep body. From Fowler, 1937.

weight, has long been thought to be the largest Cyprinoid. It is a large fish of its kind, but a larger than it, from the neighbouring peninsula of Indo-China, is now to be considered. I knew nothing of this latter as a giant fish until Dr. Smith called my attention to it. And since nothing has been published on its size, Dr. Smith kindly sent me a copy of the following data from the MS. of his unpublished 'Fishes of Siam'.

This is the largest cyprinoid fish in Siam and one of the largest in the world. One taken at Bangkok, November 3, 1923, was 2.5 meters (98 in.)

* Vide footnote, p. 376.

long, and there are other definite records of examples of this size. Fish up to 3 meters (118 in.) have undoubtedly been caught in the Menam Chao Phya in earlier years. A dried head 42 cm. (16.8 in.) long, in the collection of the Siamese Bureau of Fisheries, was from a specimen 1.61 meters (63 in.) long and 61 cm. (24 in.) deep taken at Paknam, August 24, 1924. A scale from the side of this fish was 6.8 cm. (2.7 in.) long and 5.7 cm. (2.25 in.) wide; a scale from the back near the head was 8.5 cm. (3.4 in.) long and 8 cm. (3.2 in.) wide.

Dr. Smith had a drawing of this magnificent carp loaned by the Siamese government for reproduction in his book, but since the book has not yet been published, the figure is not available. However, he very kindly called my attention to an excellent figure by H. W. Fowler (1937). This illustration is reproduced herein as Text-fig. 3. It shows a huge stocky fish, of relatively great depth and covered with huge scales.

Smith's measurements of the scales give one an idea of the size of the scales in Fowler's figure of this huge carp. As the figure of the Mahseer shows, it also has large scales. In our mounted skin in the American Museum, three scales in the vertical of the dorsal fin average about 80 mm. (3.2 in.) in vertical diameter.

It is now very much in order to compare our two giant cyprinoids, the Mahseer (*Barbus tor*) and the Pla Kaho (*Callocarpio siamensis*) as portrayed in Fig. 1, pl. I, and in Text-fig. 3. The Mahseer is a large fish, but it is trim-built with a small head and pointed snout, and with a deep body having a clear run. One can readily understand that it is a fine sporting fish for Indian anglers. Now let us turn to Fowler's figure (my Text-fig. 4) and note the great contrast. Fowler thus characterizes the genus *Callocarpio*: 'Body short, deep, compressed, deepest at the dorsal origin. Head very large, robust, long as body without caudal [i.e. tail]. Snout large broad, obtuse as viewed from above.' And further on—'A very curious genus characterized by its remarkable combination of characters.' And then of the most marked organ of all, he writes—'The head is remarkably large.'

When one looks at the well-portrayed fish of Text-fig. 3 one sees the justification for every statement made above. Contrasted with the Mahseer, no one could ever think of the Pla Kaho as a sporting fish. When one remembers that the largest mahseer measured but 66 in. and weighed only 104 lbs., while Smith says that the Pla Kaho has been measured up to 98 in., which fish must have weighed quite 250 lbs., then one is prepared to believe that the Siamese fish is the largest cyprinoid in the world. Such a colossal carp must be very powerful, and on this point the words of a native Siamese writer may be quoted. Thus Mom Chao Vipulya says (1923) that, when a Pla Kaho is hooked on a hand line, 'The fishermen let their small boats be dragged about until the fish is tired, which may take two or three hours.' This recalls the like exploits of the Pla Bük as recorded earlier. Undoubtedly *Callocarpio siamensis* is the largest and most powerful cyprinoid in the world.

THE GREAT STURGEONS OF CHINA.

It is surprising to find that there are four great sturgeons found in the rivers of China and Manchuria. The crowded millions of China are hard put to it for meat food, but their rivers teem with fishes and the Chinese are great fishermen and fish-eaters. Probably their sturgeons are nowadays not often allowed to attain the size that they formerly did, but here are the facts that I have been able to gather. My colleague, Mr. John T. Nichols, in his forthcoming great report on 'The Freshwater Fishes of China', recognizes four species. All of them are much valued as food.

As shown in the first article of this series (Gudger, 1942), sturgeons have an old if not a 'distinguished' ancestry. They certainly belong to one of the 'F. F. Fs.'—first families of fishes. They are Ganoids, as their rows of large and heavy scales show. These scales are composed of bone with an outer layer of shining enamel called ganoin. Hence the shiny scales of these fishes proclaim their family affinities—they belong to the group Ganoidei. These Chinese sturgeons will be studied in the order of discovery.

The Chinese Royal Sturgeon, *Acipenser sinensis*.

The Chinese call this fish *Huang Yu*, which means Emperor Fish, since, when a specimen is caught, it must be sent to the reigning monarch. This recalls the custom formerly prevalent in England, that when a sturgeon was caught in the Thames within the jurisdiction of the Lord Mayor of London, it was considered a Royal Fish and was at once sent to the King.

The Chinese Royal Sturgeon was described by J. E. Gray at a meeting of the Zoological Society of London, November 11, 1834, and was separately figured in color that same year (Gray, 1834, 2, pl. 98). Gray's splendid figure is reproduced herein as Fig. 1, pl. III. Attention is called to the large and beautifully sculptured ganoid scales on back, side and abdomen.

This sturgeon, while of rather slender build, grows to a considerable size. Thus Sowerby states (1923) that a nine-foot specimen was mounted and on exhibition in the Tsi-nan Fu Institute. He also records one taken in the Dragon River, Fukien, which measured 11.5 ft. and weighed 438 lbs. It was purchased by a wealthy merchant, was photographed and then set free in the Min River at Lim Po. Sowerby unfortunately got no copy of the photograph.

Last of all, for data as to size, I can quote the Chinese naturalist, C. Ping, who (1931) nearly 100 years after Gray stated that 'The Chinese Sturgeon . . . reaches over three meters [c. 10 feet] in mature size and is easy to be recognized by the rows of bony [ganoid] scutes along the median lines of the dorsal lateral and ventral surfaces'—as Gray's illustration (Fig. 1, pl. II) shows. It is found in the Yangtze from Woosung to Ichang.



Fig. 1.—The Chinese Royal Sturgeon (*Acipenser sinensis*). Note the beautiful sculpturing of the large ganoid scales.
After J. E. Gray, 1834.

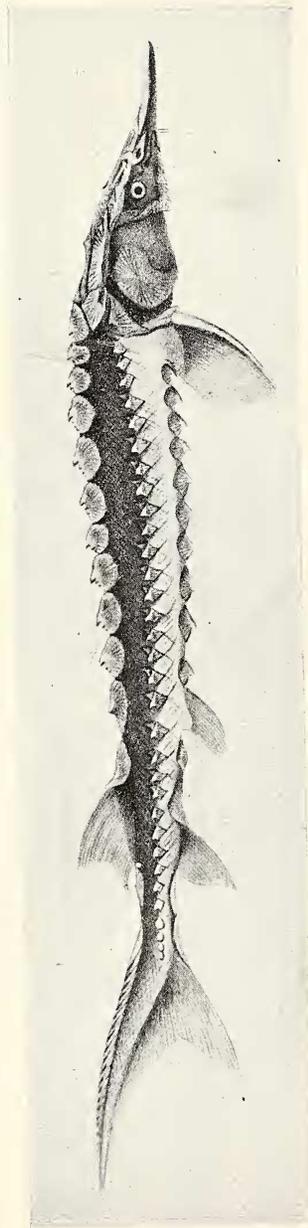


Fig. 2.—Dabry's Sturgeon (*Acipenser dabryanus*). Contrast the scales on the lower side of the body with those of the Chinese Royal Sturgeon. After Duméril, 1868.

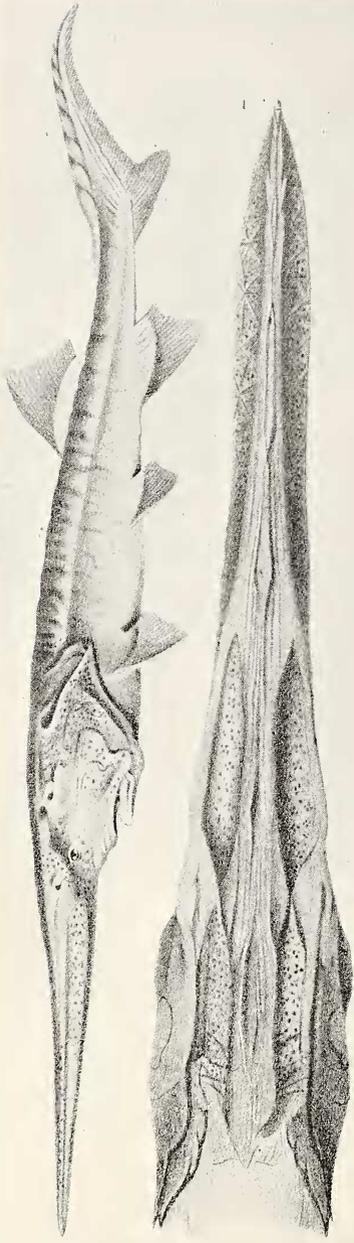


Fig. 1.—The most remarkable of all Sturgeons, the Swordbill, *Xiphias gladius*. The underhung mouth and the long bill recall the Broad-billed Swordfish, *Ziphius gladius*. But underhung mouth and strongly heterocercal tail are also characteristics of a shark.
After Duméril, 1868.

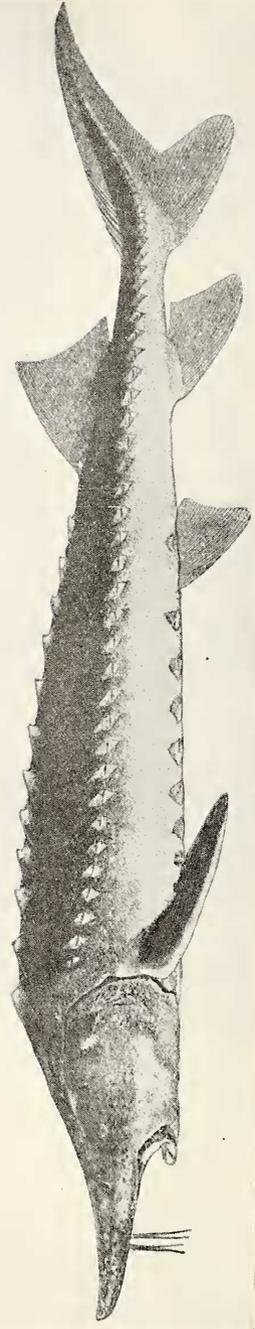


Fig. 2.—The greatest of all Asiatic Sturgeons, the Kaluga (*Huso dauricus*) of the Amur River. Note how much bulkier it is (especially in the forward region) than the Chinese Sturgeons. After Berg, 1932.